Name: _____

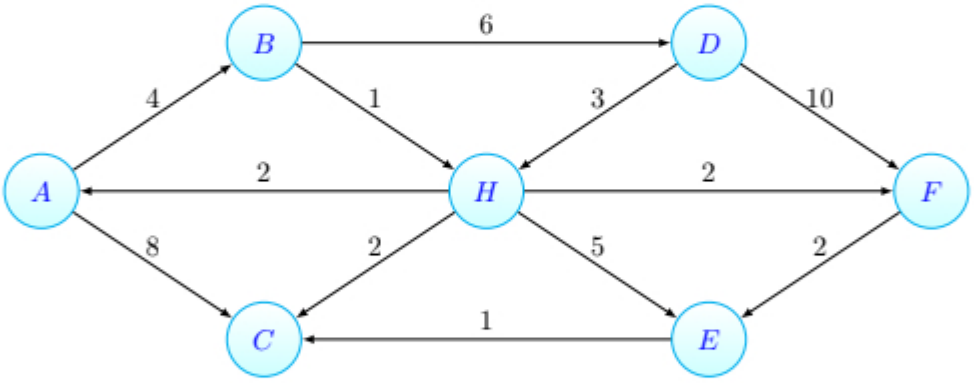
ID: _____

CSCI 3104, Algorithms **Profs. Chen & Grochow**

Quiz 6 **Spring 2020, CU-Boulder**

Instructions: This quiz is open book and open note. You **may** post clarification questions to Piazza, with the understanding that you may not receive an answer in time and posting does count towards your 30 minutes. Questions posted to Piazza **must be posted as PRIVATE QUESTIONS.** Other use of the internet, including searching for answers or posting to sites like Chegg, is strictly prohibited. Violations of these grounds to receive a 0 on this quiz. Proofs should be written in **complete sentences. Show and justify all work to receive full credit.**

Standard 15. Consider the following directed, weighted graph G. At the first iteration of Dijksrta's Algorithm, using A as the source vertex, we examine both the (A, B) and (A, C) edges by placing them into a priority queue. However, only (A, B) is selected at the first iteration.



(a) What are the next five edges **selected** by Dijkstra's algorithm? After these have been selected, what are the distances from A that the algorithm has recorded for each vertex in G?

Solution: There are two possible solutions:

- Solution 1: BG, GF, FE, EC, BD. In this case, the distances are:

$$d(A, B) = 4$$
$$d(A, D) = 10$$
$$d(A, G) = 5$$
$$d(A, F) = 7$$
$$d(A, E) = 9$$
$$d(A, C) = 10$$

- Solution 2: BG, GC, GF, FE, BD. In this case, the distances are:

$$d(A, B) = 4$$
$$d(A, D) = 10$$
$$d(A, G) = 5$$
$$d(A, C) = 7$$
$$d(A, F) = 7$$
$$d(A, E) = 9$$

Review the course notes for details as to how Dijkstra's algorithm works.